

R E M A R K S

I. INTRODUCTION

Applicant wants to thank the Examiner for his careful consideration of the subject application. Applicant has amended claims 1, 36 cancelled claims 9-10, 15-16, 22-23 and added new claims 37-44. Claims 1-8, 11-14, 24-26, 35-44 are presently pending in the application. Applicant hereby requests further examination and reconsideration of the application in view of the foregoing amendments and the following arguments.

II. REJECTION OF CLAIMS 1, 15, 22-23, 36 UNDER U.S.C. 102(b)

Claims 1, 15, 22, 23 stand rejected under 35 U.S.C. 102(b) as being anticipated by Schroeder (5,598,814). Applicant has cancelled claims 15, 22-23.

The Examiner indicated that claim 9, which depends from claim 1, would be allowable if written in independent form. Applicant has amended claim 1 to include all of the limitations of dependent claim 9. Accordingly, Applicant submits that claim 1 is allowable.

Referring to independent claim 36, as amended, a method for controlling a camless valve assembly in an engine is recited. The method includes:

opening said valve using an electrically driven ball-screw device at a first opening rate to control gas flow into said cylinder during a first combustion cycle of said cylinder; and,
opening said valve using said ball-screw device at a second opening rate to control gas

flow into said cylinder during a second combustion cycle of said cylinder.

Referring to Schroeder, a motor 10 is utilized to rotate a cam 24 having cam lobes 36 to axially move a sleeve 30 having rollers 44 proximate the lobes 36. Schroeder, however, does not provide any teaching of using an electrically driven ball-screw device to move valve 18. Accordingly, Applicant submits that the rejection of claim 36, as amended, under 35 U.S.C. 102(b) is improper. Accordingly, Applicant request that the rejection of claim 36 be withdrawn.

III. REJECTION OF CLAIMS 13, 14 UNDER 35 U.S.C. 102(b)

Claims 13, 14 stand rejected under 35 U.S.C. 102(b) as being anticipated by Beblavi (4,452,423). Applicant respectfully submits that the rejection of claims 13, 14 under 35 U.S.C. 102(b) is improper because Beblavi fails to teach all of the limitations of the claims.

Referring to claim 13, an electromechanical valve assembly is recited. The assembly includes in part:

...a valve having a valve stem and a valve head...

...said valve moves axially responsive to rotation of said rotor to move said valve head against a valve seat in said engine to prevent gas flow into or out of an engine cylinder.

Referring to Beblavi, the reference describes a magnetically actuated valve that control fluid flow through a "pipe." See column 2, lines 40-43. Applicant, however, after carefully reviewing Beblavi has been unable to find any teaching within Beblavi valve of controlling flow into an engine cylinder. In particular, Applicant has been unable to find any teaching of a valve assembly that moves "said valve head against a valve

seat in said engine to prevent gas flow into or out of an engine cylinder", as recited in claim 13. This makes sense since Beblavi simply teaches utilizing the valve 10 to control flow between two pipes 12, 14. Further, one skilled in the art will clearly recognize that valve 10 (of Beblavi) could not seal against known cylinder valve seats.

Referring to claim 14, an electromechanical valve assembly is also recited. Claim 14 recites:

a rotary electric actuator having a rotatable ballnut; and,

a valve having a valve stem and a valve head, said valve stem operatively connected to said ballnut, said valve stem configured to move generally axially responsive to the rotation of said ballnut to selectively engage and disengage said valve head with a valve seat on a cylinder head of said engine.

As discussed above, Beblavi simply fails to provide any teaching of engaging a valve head with a valve seat in an engine.

Because Beblavi fails to teach all of the limitations of claims 13, 14, Applicant submits that the rejection of claims 13, 14 under 35 U.S.C. 102(b) is improper. Accordingly, Applicant requests that the rejection of claims 13, 14 be withdrawn.

IV. REJECTION OF CLAIMS 2, 4, 16, 26 UNDER 35 U.S.C. 103(a)

Claims 2, 4, 16, 26 stand rejected under 35 U.S.C. 103(a) as being unpatentable Schroeder in view of Beblavi. Claim 16 has been cancelled.

Claim 1 has been amended to incorporate the limitations of claim 9 which the Examiner indicated would be allowable.

Because claims 2, 4 depend from claim 1, Applicant submits that claims 2, 4, are also allowable.

Referring to claim 26, an internal combustion engine is recited. The engine includes:

an engine cylinder; and,
a camless valve assembly having a valve communicating with said engine cylinder, said assembly adjusting an opening rate of said valve to control gas flow into said engine cylinder, wherein said camless valve assembly includes an electrically driven ball-screw arrangement to axially move a valve head.

Applicants respectfully submit that the rejection of claim 26 under 35 U.S.C. 103(a) based on Schroeder and Beblavi is improper because the Examiner has provided no proper motivation for the combination.

Referring to Schroeder, Applicant will now show that no proper motivation exists for the proposed combination because the combination would either: (i) destroy the intended functionality of the primary reference, or (ii) result in an unworkable system. Referring to Figure 1 of Schroeder, a motor 10 is illustrated which presumably includes an internal stator and rotor. Further, the Schroeder purports to utilize a rotating cam 24 to move follower sleeve 30 axially to thereby axially move a valve 18. Neither reference, however, provides any teaching for either (i) what components of Beblavi would be added to the Schroeder system or (ii) how the various components of Beblavi would be positioned in the Schroeder system.

Referring to Figure 1 of Beblavi, however, lets assume that the stator 38, rotor 28, and ball-screw system of Beblavi somehow replaced the stator and rotor in motor 10 of

Schroeder. This combination would result in the functionality of cam 24 and follower sleeve 30 (of Schroeder) being destroyed. Accordingly, one skilled in the art would not even attempt such a combination.

Alternately, for purposes of discussion, lets assume cam mechanism 16 and follower sleeve 30 were somehow replaced by the stator 38, rotor 28, (of Beblavi) and the ball-screw-arrangement of Beblavi. This combination would result in the stator 38, rotor 28 never being energized--since motor 10 of Schroeder also includes a stator and rotor. In other words, this configuration would result in first stator-rotor pair and a second stator-rotor pair with one pair being unused. Further, even if one assumed such a combination were somehow possible, there is absolutely no teaching in either reference for how stator 38, rotor 28, and ball-screw-arrangement of Beblavi could be positioned or coupled to the components of Schroeder to implement an operable system.

In summary, the combined teachings of Schroeder and Beblavi would either destroy the functionality of Schroeder or result in an inoperable system.

Finally, after carefully reviewing both references, Applicant can find no teaching that the ball bearing and helical grooves in Beblavi would have a lower friction than the cam lobe/roller configuration of Schroeder. Accordingly, Examiner's reliance on lower friction as motivation for the combination has no support in either reference and is therefore improper.

Because the Examiner has not identified any proper motivation for the proposed combination, Applicant submits that the rejection of claim 26 under 35 U.S.C. 103(a) is improper. Accordingly, Applicant requests that the rejection of claim 26 be withdrawn.

V. NEW CLAIMS 37-44

Independent claim 37 includes the limitations of both claim 1 and claim 10 which the Examiner indicated would be allowable. Accordingly, Applicant submits that claim 37 is allowable.

Independent claim 38 recites an electromechanical valve assembly including:

a valve member threadably engaging said
rotor, said member moving towards a valve seat of
an engine cylinder when said rotor rotates in a
first direction to restrict flow into or out of
said cylinder.

Applicant submits that neither Beblavi nor Schroeder teach a valve member threadably engaging the rotor nor teach moving the valve member towards a valve seat of a cylinder. Accordingly, Applicant submits that claim 38, and claims 39, 40 which depend from claim 38, are allowable.

Independent claim 41 recites an electromechanical valve assembly including:

a valve member;
an electrically actuated ball-screw device
operably coupled to said valve member, said device
moving said member towards a valve seat of an
engine cylinder.

Applicant submits that neither Beblavi nor Schroeder teach use of an electrically actuated ball-screw device operably coupled to a valve member to move the member toward a cylinder valve seat, as recited in claim 41. Accordingly, Applicant submits that claim 41, and claims 42, 43 which depend from claim 41, are allowable.

Independent claim 44 recites a method for controlling an electromechanical valve in an internal combustion engine. The method includes:

controlling movement of a valve member based on an electrical control signal;

generating a position signal indicative of a position of said valve member; and,

commanding said valve member to stop when said position signal indicates said valve member is proximate a valve seat of an engine cylinder.


Neither Beblavi or Schroeder teaching using a position sensor to control the stopping position of a valve member, as recited in claim 44. Accordingly, Applicant submits that claim 44 is allowable.

VI. CONCLUSION

For the above-cited reasons, all the claims presently pending in this application are believed to be allowable. If the Examiner has any further questions or concerning regarding

this matter, he is invited to call the Applicant's under signed attorney.

Respectfully submitted,



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Attachment

The marked up version of claims 1, 36 are as follows:

1. An electromechanical valve assembly for an internal combustion engine, said engine having an engine cylinder, said assembly comprising:

a rotor centered about a first axis having a bore extending generally axially therethrough;

a stator operatively disposed about said rotor for producing a torque to cause rotation of said rotor about said first axis; [and,]

a valve having a valve stem and a valve head, said valve stem configured to move upwardly when said rotor rotates in a first direction to move said valve head against a valve seat in said engine to prevent gas flow into or out of said engine cylinder; and,

an anti-twist guide for preventing said valve stem from rotating about said first axis.

36. A method for controlling a camless valve assembly in an engine, said engine having an engine cylinder, said valve assembly having a valve communicating with said cylinder, said method comprising:

opening said valve [of said camless valve assembly] using an electrically driven ball-screw device at a first opening rate to control gas flow into said cylinder during a first combustion cycle of said cylinder; and,

opening said valve [of said camless valve assembly] said ball-screw device at a second opening rate to control gas flow into said cylinder during a second combustion cycle of said cylinder.